

A new framework for economic growth theory

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Economic growth theory, as explained in textbooks and research papers, is a quantitative theory. The quantity that is supposed to grow is the GDP, a measure of the aggregated output of a country. GDP is supposed to be proportional to the real physical output of an economy. But the notion of a quantitative measure of output is not well defined and, in addition, we need a new framework where growth can be both quantitative and qualitative.

The computation and use of GDP was spearheaded by Kuznets in 1936. GDP aggregates output by economic value, that is, prices. Therefore growth is growth of the value of the output of a nation. Now, the first critical observation is that there is no physical variable that could be used to measure aggregated output. There is no common physical characteristic that allows cumulating things as diverse as cars, travels, food. Still we would like to understand if and how growth, or eventually lack of growth, is related to any kind of physical growth. To this end nominal GDP is discounted to yield real GDP which is considered a proxy for the true output of an economy. Let's therefore discuss real vs nominal quantities.

The GDP which is measured every year is a nominal quantity, that is, it is based on current prices. But prices, and therefore nominal GDP, are only relative prices and therefore are defined up to a multiplicative constant. This fact does not create any problem at any given instant but it does create problems if we compare prices in different moments. In fact, if the multiplier changes in time comparisons of prices, and therefore GDP, between different moments become meaningless.

Actually the multiplier is arbitrary. We can express prices in different scales. For example, in 1960 France changed the Franc into the New Franc which was worth exactly 100 times the old franc. It was a purely formal change. For a while shops exhibited prices in both the Old and the New franc to facilitate clients to make comparisons and calculations. But there was no real effect because every payment was made in the New Franc and wages were paid in New Francs.

If we look at all prices of an economy we cannot say what the multiplier is. We can only say that two price systems are equivalent if they are proportional. There is no natural objective price system. Now, in the normal functioning of any economy, prices change in time but not in the same proportions. The problem is to find a single multiplier that best approximates all these price changes.

Economists think that some changes of prices are truly due to real economic changes while other changes are due to monetary artifacts. Here we begin to see the nature of the problem we want to discuss. We would like to capture real, physical changes of the economy. However, no physical variable can be used to aggregate output. Therefore, we use prices to aggregate output computing

nominal GDP. But then we say that nominal GDP does not really reflect physical output and we apply corrections to prices.

Borrowing concepts from physics, we could perhaps say that prices form a coordinate system and that we are looking for invariants. But we have to be careful not to push the analogy too far. The usual way to correct prices is through a deflator. It is often said that the deflator reflects the general price level. However, the concept of a price level is not well defined.

The usual way economists and also Governments, define the deflator is the following. First a basket of goods that are supposed to remain unchanged for some time is chosen. There are different ways of weighting each component in the basket. A reasonable way is to give each component a weight proportional to the weight it actually has in the economy.

The value of the basket at time t is observed. Then, keeping the basket unchanged, the price of the basket at time $t+1$ is observed. The changes in prices are considered spurious, not due to real economic changes. The change of the price of the basket is used to compute inflation and to deflate nominal prices to obtain real prices.

The basket, in general, contains a large fraction of the goods and services used by the average individual in his/her daily life. For this reason, its price change is a reasonably good indicator of inflation as felt by the average consumer. When it is used in economic theory, however, it cannot really be considered a deflator from nominal to real prices.

The usual deflator based on a Consumer Price Index has a fundamental drawback: it does not capture changes in products. By its definition the CPI measures the change in price of given products. In the past, economic changes were relatively slow and products remained unchanged for long periods of time. But in modern economies products and services change rapidly. Measuring the changes in price of given products we completely fail to capture product innovation.

In mainstream economics, inflation is considered a reality. The centrality given to the CPI in deflating nominal prices is ill placed. It should be clearly understood that changes of the CPI only reflect changes of prices of a subset of products of an economy without taking into account changes and innovation.

Growth theory is based on this framework: Nominal GDP is computed and then deflated by an index that represents the change in the price level. The deflated nominal GDP is called the real GDP which is considered a “proxy” for the measure of the real output of an economy. Growth is measured as the percentage change of real GDP.

This procedure has two fundamental faults. First, there are many possible indexes to be used as deflators. In practice, three indices are used: the Laspeyres index and the Paasche index that differ in how prices are weighted at the beginning and the end of the period, and the Fisher index

which is the geometrical average of the two previous indexes. But there is no true index, each index represents a view on price changes.

Second, and this is the most important aspect, qualitative changes are not taken into account. Hedonic measurement, based on pricing features instead of products, cannot represent the level of innovation of modern economies.

It should be clear that economic growth, as measured today, represents only a partial view of the evolution of modern economies. This is becoming critical as purely quantitative growth causes increasing environmental damages. It is becoming clear that a change in our notion of growth is necessary if we want to survive.

We should bring to economics an approach that has become widely accepted in the physical sciences: Theories are models that connect observations. In the physical sciences variables might not have interpretations. The Copenhagen interpretation of quantum mechanics explicitly states that theories are mathematical models without any pretension to describe a physical reality.

Economics should adopt the same basic framework. There is no possible physical measurement of economic output. Nominal GDP represents the monetary value of economic output. Inflation, as computed today, represents the average changes in prices experienced by a low to middle income household. It is a valuable parameter but it cannot be used to discount the entire economic output. For example, after the 2007-2009 crisis, most Western economies experienced nominal growth and almost no inflation. Actually, average people experienced stagnant wages while growth was concentrated in the most affluent part of the economy where products and services exhibit high level of innovation and where it is basically impossible to measure inflation.

If we want to understand growth, or lack of growth, in modern economies we have to take a multidimensional framework. A single number to measure economic output is misleading and becomes a tool for political manipulations. We have to take complexity seriously and try to understand the true complexity of economic output. A new framework for economic growth should search for variables that are meaningful from the point of view of the entire economy.

